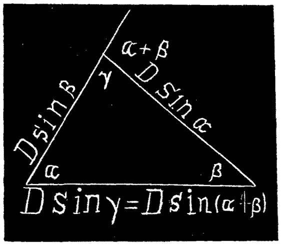
Likewise it seems desirable to supplement the usual analytic derivation of $\tan\frac{1}{2}A=r/(s-a)$ by a purely geometric proof (MONTHLY, 1902, p. 36).



Theorem. *The compound of a sphere on the diameter OP with a sphere on the diameter OR is a sphere having as diameter the diagonal OQ of the parallelogram OPQR.*

The proof is similar to the above for circles. If three parallel planes make equal intercepts on one transversal they make equal intercepts on any other transversal.

DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ALGEBRA.

228. **Proposed by G. W. GREENWOOD, M. A. (Oxon), Professor of Mathematics, McKendree College, Lebanon, Ill.**

Sum the infinite series

$$\frac{1}{11.13}+\frac{1}{23.25}+\frac{1}{35.37}+\frac{1}{47.49}+\frac{1}{59.61}+\dots\dots \quad \text{[Oxford, 1895].}$$

Solution by the PROPOSER.

We can show that*

$$\frac{1}{2\theta}\left[\frac{1}{\theta}-\cot\theta\right]=\frac{1}{(\pi-\theta)(\pi+\theta)}+\frac{1}{(2\pi-\theta)(2\pi+\theta)}+\frac{1}{(3\pi-\theta)(3\pi+\theta)}+\dots\dots$$

Put $\theta=\pi/12$ and we get

$$\frac{\pi}{6}\left[\frac{12-\pi\cot 15^\circ}{\pi}\right]=\frac{144}{\pi^2}\left[\frac{1}{11.13}+\frac{1}{23.25}+\dots\dots\right].$$

Hence the required sum $=\dfrac{12-\pi\cot 15^\circ}{24}$.

Also solved by J. Scheffer.

229. **Proposed by B. F. YANNEY, Mount Union College, Alliance, O.**

If $a_1^n+a_2^n+a_3^n+\dots\dots+a_r^n=A^n$, $a_1^m+a_2^m+a_3^m+\dots\dots+a_r^m>$ or $<A^m$, according as $m<$ or $>n$; provided all the letters stand for positive real numbers.

No satisfactory solution has been received.

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*Expand $\sin\theta$ in factors, take logarithms of each expression, and differentiate.